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Editorial:

Genesis and Marriage

"Issues facing Christians today" is the title of a useful and influential book authored by John Stott. Each "issue" is presented by reference to biblical texts that ground our thinking in God's truth. Significantly, of the 12 specific issues, 6 refer to verses in the book of Genesis as "key passages". The first book of the Bible really does provide us with solid foundations. The chapters on marriage and homosexuality illustrate this clearly. Stott builds on the three dimensions of marriage identified in Genesis 1 and 2: the procreation and nurture of children (1:28), companionship and mutual support (2:18) and self-giving love expressed in sexual union (2:23-24). Both marriage and homosexuality are central issues today, particularly because of the Government's zeal to pass the Marriage (Same Sex Couples) Bill.

Bill supporters say that this is an equality issue and a matter of justice. They say that homosexual men and lesbians are disadvantaged by present legislation relating to societal relationships. Opposition to the Bill has been coordinated by the Coalition for Marriage, endorsed by other organisations such as Christian Concern and the Christian Institute. They argue that the existing civil partnership laws already provide for equality, that marriage has a traditional meaning that involves a lifelong union between a man and a woman, and is protected by legislation that considers adultery to be a crime against marriage and grounds for divorce. Additional arguments are that marriage is fundamental for family life and the best environment for raising children. Marriage is said to be foundational for society.

Meanwhile, legal decisions in the UK show just how far a particular type of "equality" has influenced our society. A landmark case was that of the elderly couple, Mr and Mrs Bull, owners of a Christian B&B business in Cornwall. For 25 years, they have operated a policy of offering a double bed only to married couples. When civil partnerships were first introduced, government ministers said that they were contracts and did not amount to marriage. This policy was tested by two men in a civil partnership who took them to court after being refused a room with a double bed. The two men were supported by the taxpayer-funded state equality body the Equality and Human Rights Commission, whereas the Bulls were supported by the privately-funded Christian Institute. Mr and Mrs Bull were required to pay damages of £3600, for contravening the Sexual Orientation Regulations. The judge said: "There is no material difference between marriage and a civil partnership" (*Daily Mail,* 20 January 2011). Keith Porteous Wood, of the National Secular Society, said: "The court has resisted the pernicious claim that exercising conscience, be it Christian or any other kind, is a carte blanche to defy the law." Judge Andrew Rutherford's decision was in the tradition of judges making law by interpreting Parliamentary decisions. The legal experts must have felt something was wrong though, because otherwise there would be no urgency about bringing in legislation on same-sex marriage.

Legal cases involving Christians who have been accused of discriminatory behaviour are featured on the Christian Concern web site. These include experienced foster carers Eunice and Owen Johns (councils can require the promotion of homosexuality and can stop Christians from fostering children on this basis); Lesley Pilkington, a counsellor (a homosexual man deceived her into believing that he wanted counselling for unwanted same-sex attraction and later accused her of unprofessional conduct); Gary McFarlane, a relationship counsellor, (dismissed for gross misconduct after he refused to confirm that he would provide directive sex therapy to homosexual couples due to his religious beliefs); Kwabena Peat, a Christian teacher, (suspended after he sent letters to other staff members complaining that a staff training day was used to promote homosexual rights); Dr Sheila Matthews, paediatrician (dismissed from her role on the local authority's adoption panel after requesting to refrain from voting when homosexual couples were being considered by the panel as potential adoptive parents); Andrew McClintock, Christian Magistrate (forced to resign from the Family Panel because he was not allowed to opt-out of cases which would require him to place children in the care of homosexuals); and Theresa Davies, a registrar with Islington Borough Council (demoted from her job because of her refusal to preside over civil partnership ceremonies).

One further example concerns Professor David Watts, who for many years edited *"Biblical Creation",* the predecessor to *"Origins".* Merely signing the Coalition for Marriage petition to support traditional marriage attracted the wrath of Student Union leaders who presented his stance as undermining the pursuit of equality. The image (on page 25) is a scan of the student newspaper dated 11 February 2013 – the title says it all! The Women's Officer declared: "Professor Watts has every right to his faith and his belief, but to present this as scientific fact, backed up by a Professorship in Dentistry, is at best

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Is the biblical "Adam" a scientifically valid concept?

J H John Peet

Adam of Genesis 1-5 is basic to much biblical teaching. The Genesis account makes it plain that we are all descended from this one man. This is reiterated by Paul, for example, who says that we are all descended from Adam (Acts 17:26; cf. 1 Corinthians 15:45; Genesis 3:20). Of course, continuing with the biblical record, we are all descended from Noah too. Paul also uses Adam's existence as a base for various theological arguments, especially in 1 Corinthians 15 and Romans 5. His arguments for the historicity of Adam are powerful and make it difficult to deny as he links Adam's actions to those of our Lord Jesus. In accordance with these teachings, evangelicals have traditionally believed that Adam and Eve were directly created by God and are the historical parents of the entire human race.

"Creationists" are known to take these principles seriously but Dr Denis Alexander, who opposes the creationist approach, also recognises the historicity of Adam and seeks to compare his historical occurrence to the evolutionary timescale. He sees Adam and Eve as a couple among *Homo erectus* types in whom God planted His image. Of course, Dr Alexander does appear to dispute that all modern humans have descended from Adam.

How we argue our case will be dependent on our primary source of authority. For evangelicals, the Bible has been our foundational guide and has traditionally been understood to speak of the special creation of the man, Adam, and his woman, Eve, from whom we all descended. Others, especially non-Christians, use scientific thinking as their authority. For many, "science" is the current consensus of the thinking of leading scientists. However, it is important to acknowledge that we scientists can get things wrong and often have to change our theories or models of explanation. For all of us, our interpretation will be within our own paradigm, especially that of the ultimate authority.

> "Collins says that claims that Adam and Eve were the first couple from whom all are descended does not fit the scientific evidence."

Is Adam historical?

So, where is the problem that we are addressing? There has been a growing momentum, especially in the States, among evangelicals that Adam was not historical after all. This is highlighted on the *BioLogos* website which has a strongly theistic evolutionary approach to the interpretation of Scripture. Its founder, Francis Collins, a world leader in human genome research, does claim to be an evangelical who believes the Bible is a trustworthy document, but he re-writes our interpretation of its opening chapters. A theological response to the *BioLogos* argument has been presented by Prof. A. B. Caneday (Southern Baptist Journal of Theology, 15.1 (2011): 26-59, available on the internet).

What are the arguments for a scientifically acceptable understanding as against the historical Adam portrayed in the Bible? They seem to centre on two things: the genetics of man compared with the chimpanzee and the population genomics based on a historical interpretation of the Genesis claim.

Collins says that claims that Adam and Eve were the first couple from whom all are descended does not fit the scientific evidence. This is not a statement saying that there is an apparent discrepancy between current genetic understandings and biblical teaching that needs to be researched, but it is a blatant dismissal of the clear claims of Scripture. That is a serious situation and needs a thorough study. Creationist research in the field of genetics is in its infancy (not surprisingly as the whole field is developing rapidly) and the challenge is for creationists to engage in research in this discipline. However, we can make some significant responses emerging from research.

A key argument, which has been circulating for a number of years, is that the human genome and the chimpanzee genome have at least a 95% commonality. (The term "genome" refers to the whole genetic content of a cell). Furthermore, the genome contains a substantial quantity of so-called *pseudogenes,* which evolutionists claim to be ancient genes that are no longer active and again have similar structures in the same relative positions and with identical mutations indicating that humans and chimpanzees have come from a common primate ancestor. This, in turn, requires a belief that the common ancestor existed some 5 million years ago.

The population genomics argument

Studies in the genetic diversity among modern humans have included attempts to identify how long ago modern *Homo sapiens* originated from supposed earlier *Homo* species. Current estimates place this at around 150,000-200,000 years. According to this approach, a small group of hominids were living at that time and from whom modern *Homo sapiens* have developed. Estimates put the ancestral group size at several thousand. Dennis Venema says that the human population "was definitely never as small as two."

The researchers state quite adamantly that a literal interpretation of the Bible couple cannot be true. Interestingly, the Bible account is not represented correctly in their arguments. Yes, Adam and Eve were the created pair from whom we are descended but there was a "bottleneck" at the Flood of Noah and his family from whom, again, we are all derived. The number of descendents of Adam at the time of Noah has been estimated as several millions. The Flood wiped out most of these and so the "bottleneck" reduces the population to a mere 8 souls. That family had 3 daughters-in-law who presumably carried a diversity of genetic information in addition to that of Noah and his sons. Another biblical event that needs to be considered is the Babel event at which a large local population was dispersed from Shinar at God's command. In considering these events, those of us who hold to the biblical account as historical have to review the genetic data in the light of the population sizes of those times as against the argument of those who consider the biblical account as inadequate.

Early work on this biological concept proposed, for example, that it was possible to consider a "mitochondrial Eve", as she was nicknamed. The mitochondria are the energy-producing structures in the cell and are passed on through the female line only. A study of the variation in modern women can be extrapolated back to a possible original source. In terms of the biblical data, we have the three daughters-in-law (and Noah's wife) who would have carried different genetic information. Since they were quite possibly from lines other than the Seth-to-Noah line, there is the potential for even more variation.

The figure of 150,000 years also presumes that we know reasonably accurately the rate of genetic diversification, but that is not the case either. In fact, the estimate is based, in part at least, on the assumption of a common ancestor to humans and chimpanzees around 5-7 million years ago. It seems that this is an area which creationist research needs to explore from the aspect of the

Adam and Eve – our first parents (illustration dated 1870). © andipantz, www.istockphoto.com biblical data. A recent piece of research challenging this timing factor is mentioned below.

Genetic diversity

But, let's go back to that supposed human-chimp genetic similarity. It is generally assumed that our whole nature (at least physically, though some consider other issues such as social and moral aspects too) can be traced to genetic variations. It is recognised that variable traits between humans can be related to genetic variations – for example, eye colour, straight *vs.* curly hair, *etc.* But these variations always result in human beings! Furthermore, the genetic differences or similarities between man and the chimpanzees are insufficient to explain our differences: in communication, mathematics, music, art and worship, to name a few of those things that make us human and distinct from the animals. We are more than genes.

Steve Jones (Professor of genetics, University College, London) is no friend of creationists, but he has spoken out strongly against the assumptions about genetic similarity. "The fact that humans and chimps share 98.8% of their DNA is fairly amazing, but it still does not explain the nature of differences between humans and chimps. You have to bear in mind that humans and mushrooms share 60% of their DNA." (Cited in *The Times Higher Educational Supplement,* 10 Sep. 1999).

It is also apparent that our genes control metabolic processes and any genetic damage ("mutations") in these genes can result in, for example, disease and disability. But, again, we are still human and not chimpanzees or other primates. Many of the metabolic processes in apes and mankind are similar and so we would expect a Designer to use the same genes for their control.

But, how similar are these genomes? Other research suggests that some of these claims are overstated. It is often assumed that similar genes in different biological families have corresponding functions. Forty years ago, Sir Gavin de Beer (in "Homology: An Unsolved Problem"; Oxford University Press; 1971) pointed out that similar structures are often produced from dissimilar genes, and similar genes produce dissimilar structures. More recent work by Watanabe *et al.* confirms that the extent of genetic similarity is exaggerated. For example, 83% of the 231 genes on the chimpanzee chromosome 22 produce different amino acid sequences (and so different proteins) to the human counterpart. Also, only 4.8% of the human Y chromosome could be matched to the chimpanzee sequences. More recently, David C. Page *et al.* have studied this chromosome in more detail and comment that "By comparing the [Y chromosomes] of the two species we show that they differ radically in sequence structure and gene content, indicating rapid evolution during the past 6 million years." They conclude that 30% of the chimpanzee chromosome lacks alignment with the human analogue. Of course, these two examples are only a part of the whole genome and detailed studies of the rest is necessary as well, but these examples do show a significant differentiation.

The genetic diversity from the biblical family has been referred to above, arising initially from the four wives in addition to that in the male line. So, the descendents would have at least 50% of Noah's genetic information but a variety in each of the children of his sons through their mothers. We see that the biblical account therefore introduces a rapid diversity following the Flood.

But how long would it take for the population to develop the amount of diversity we see around us today? As we noted above, this topic is used to undermine the biblical approach. It is usually argued that it would have required millions of years. Though creation research in this area is in its infancy, recent research in the scientific community gives a different view. Some interesting work was published in 2012 by a team from the University of Washington (Tennessen, J., *et al.*). They studied the extent of the genetic variation in the current population and estimated that the maximum likely time required to reach this state would be just over 5000 years. So, the biblical account is not scientifically unreasonable.

Embarrassing pseudogenes

Over recent decades, as genetic research has advanced, it was apparent that large portions of our genome did not hold the code for the production of proteins as was assumed to be the function of the genome. These chunks of DNA (the chemical shorthand for genetic information) were considered to be evolutionary rubbish inherited from our non-human ancestors and were called "junk DNA". Recent years have revealed that this name is inappropriate as it has been found that this genetic material *does* have an extensive variety of functions. Most geneticists now avoid using the term, preferring "non-protein-coding DNA". This topic has been well covered by Jonathan Wells ("The Myth of Junk DNA"; Discovery Institute Press, Seattle. 2011).

However one persistent part of this argument concerns the material known as "pseudogenes" (that is "false genes"). Jerry Coyne, a non-Christian evolutionist, says that these are "dead genes" and expected on an evolutionary argument. They are seen as relics of good genes that have mutated to uselessness. So, Douglas Futuyma says that they are "hard to reconcile with beneficent intelligent design" and Richard Dawkins says that they are "embarrassing [to] creationists"!

But a study of the scientific literature gives a different perspective (see Geoffrey Barnard in chapter 10 of "Should Christians Embrace Evolution? Biblical and scientific responses", edited by Prof. Norman C Nevin. Professor of Medical Genetics; IVP, Nottingham. 2009). One example of a useful pseudogene is PTEN1 which has a "decoy" function. It diverts other active chemicals away from the gene PTEN and so becomes a part of a tumour suppression system. Back in 2003, Balakiev and Ayala suggested the importance of pseudogenes in gene expression, regulation and so on.

Dawkins says that, because pseudogenes have no function, they are never transcribed or translated in the genetic system. This is clearly not true. This attitude illustrates the danger of allowing our ignorance of a function to define our scientific model and explanation.

This year (2012) the scientific world had been shaken by new results from the work of the ENCODE project which had been exploring the work in the DNA previously written off as "junk". Instead of 98% of the genome being useless (or worse!), they have shown that at least 80% of the genome is functional – as predicted by creationists for several decades!

Beyond DNA

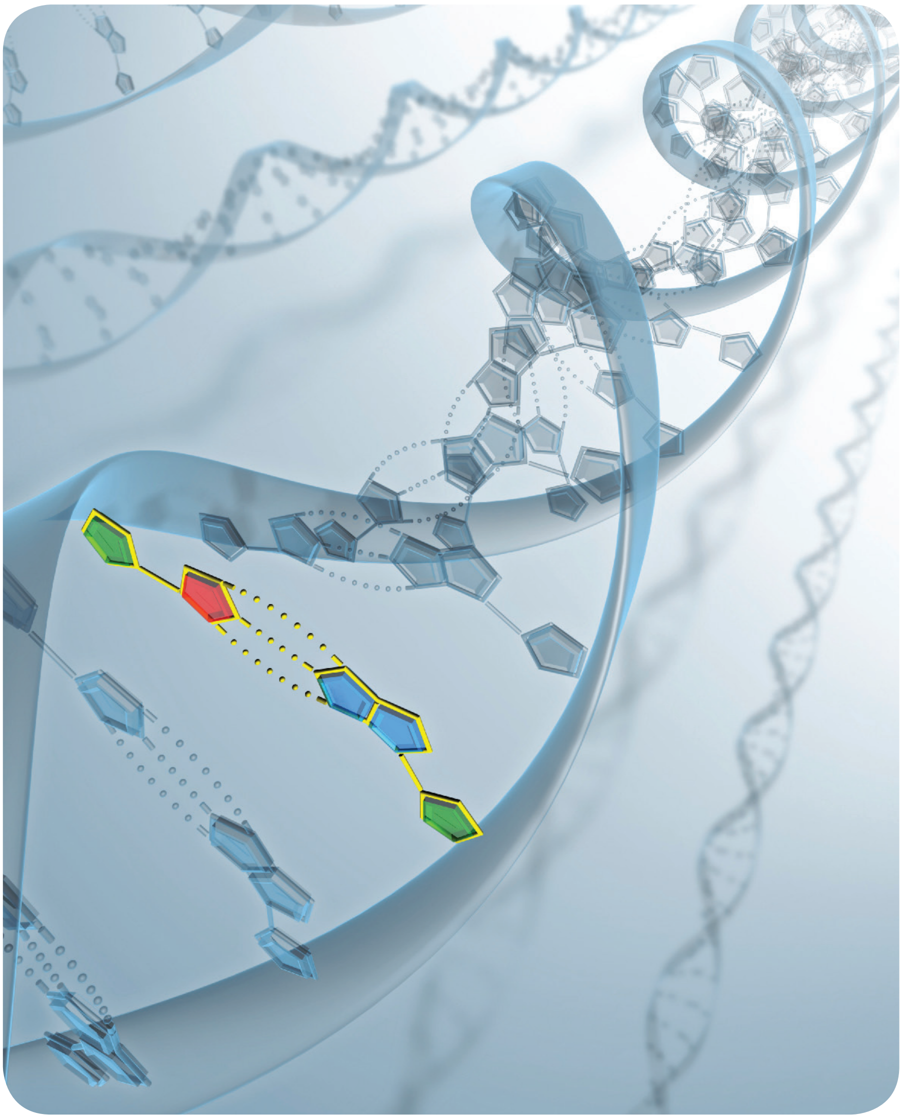
There is another aspect of biological activity which seems to be overlooked by those who discuss the concept of a possible biological relationship between apes and men. Let us remind ourselves of a basic fact. When an egg is fertilised by male sperm, genetic information from each of the parents is selected for the new creature. But, this affects only the nucleus of the cell. The egg is more than a nucleus. We have already seen that the cell contains the mitochondrion which originates solely in the female's egg. Relatively little work seems to have been done to determine what influences the rest of the egg has on the outcome. The egg has been passed from generation to generation from the time of Eve. Similarly, the egg of the female chimpanzee originates from the created animal of that kind.

Several decades ago, the British creationist, Dr Arthur Jones, spoke on "cortical inheritance" with the proposal that the overall body plan is programmed into that and that the nuclear genetic information gives the variations we have noted. (Arthur's presentations are available on YouTube). This was work that was originally reported in the 1950s.

The cell membrane and cytoplasmic structure (the contents of the cell around the nucleus) are critical to the physical structure. The genes give variety within that structure but they need the structure to direct their effects.

This work has recently been given a higher profile with the publication of "The Mysterious Epigenome: What lies beyond DNA" by Woodward and Gills (Kregel Publications, Grand Rapids. 2012) and other books. A staggering conclusion is that there are around 210 different versions of the epigenome required to produce our variety of cells. One of the key aspects of this work is the identification of "switches" that control the activity of different genes. It is through these switches that the cells become differentiated in the developing embryo to direct some to become muscles, some to form skin and so on. Research into stem cells has made use of this newly discovered information to find a way of reversing the process so that, for example, a skin cell can we treated and switched back into a zygote. This can then be retriggered to produce the differentiated cell required for medical purposes. The researchers into this successful methodology were awarded a Nobel Prize for Biology this year (2012).

Now there's a massive research programme to explore the wonders of the Human Genome Project!



Nuclear genetic information is stored in the DNA molecule. © ktsimage, www.istockphoto.com

Conclusion

The fundamental biblical challenge to this argument about the historicity of Adam was outlined at the beginning of this article. As one theologian expressed it, "Can the Bible's theology be true if the historical events on which the theology is based are false?" Nowhere in the later biblical books are the events of Genesis 1-3 challenged or "down-graded". There are plenty of occasions where our God could have corrected man's understanding if the recorded events were less that historical. Our Lord Jesus never hesitated to correct His contemporaries if they misinterpreted the Scriptures. It is a serious charge (that this author has heard) that our Lord was merely a "man of His time".

Much more can be said illustrating the depth of our concern at the way Scripture is handled because of current scientific theory. We have seen that the scientific approach is not necessarily as "foolproof" as it might appear and we have introduced a challenge to scientists with, for example, a creationist approach to take up this challenge and research in depth.

One of the disturbing aspects of this work is the way a number of outstanding evangelical theologians with no scientific training themselves are doing theological somersaults to try and accommodate even the tentative findings of scientists. We love these men and our scientific brothers in Christ, but we plead that they would trust that God means what He says. ■

The Genre and Goals of Genesis 1–11

Part 2

James E. Patrick

In the first article the genre of Genesis 1–11 was investigated by comparing Genesis 1 with Psalm 104, and the genealogies and Flood narrative with equivalent literature from the ancient Near East. On this basis it is clear that the earliest hearers of the first eleven chapters of Genesis would have viewed them as an accurate record of history from creation to the time of Abraham, relevant both for understanding human civilisation and for scientific study of the natural world. History is not an end in itself, though, but is meant to teach certain lessons. Several of these goals of Genesis 1–11 are explored in this article.

The back-story of the numbers in Genesis

Even before considering the messages of Genesis 1–11, though, it has rarely been noted how crucial its chronological framework is, simply for understanding the stories it records.[1] The same is true of the chronology of Genesis as a whole, suggesting that the author considered the objective calculation of time to be a necessary foundation for understanding history's theological significance.

- Noah was born during the reign of Enosh, just 14 years after the death of Seth who had been the appointed 'seed' of Eve (4:25; cf. 3:15). This explains why Lamech called his son 'Noah' (5:29), referring back to Adam's curse in 3:1719, and also why it was only in the time (i.e. reign) of Enosh that humans "began to call upon the name of the Lord" (4:26) – the 'seed' had died without the promise being fulfilled, and this would have provoked a great searching of souls.
- Noah was five hundred years old before his first son Japheth was born (5:32; cf. 9:24; 10:21; 11:10), far older than any of his ancestors had been when starting a family. Yet when one notes that the prophecy of imminent judgement on mankind had been given only twenty years earlier (6:3), one can see why Noah felt the need to marry, ending his celibacy protest against the sexual licentiousness of his generation (6:12), in order to prepare for post-Flood repopulation.

> "Noah felt the need to marry, ending his celibacy protest against the sexual licentiousness of his generation."

- Peleg was given the name 'division' at birth, apparently in response to the dispersion of nations from Babel (10:25), which would put the interruption of the Tower of Babel almost exactly a century after the end of the Flood. Nimrod as the firstborn of Ham's firstborn had probably therefore reached his prime about forty years before this event, which would explain why he is credited with establishing two different kingdoms, the first "in the land of Shinar" where Babel was located (11:2), and the second far to the north in Assyria instead (10:1012). The dispersion from Babel should probably also be seen as partly to blame for the drastic reduction of lifespan from Peleg onwards, due to loss of shared traditional knowledge and genetic longevity traits.
- Terah set out for Canaan less than twenty years after Noah's death, presumably because Noah's subjugation of Canaan to Shem and his heirs was now irrevocable (9:2527; 10:1519). He got no further than Haran, however, and so his son Abram responded to God's call to complete the journey (cf. Luke 9:59-60), evidently leaving Haran when his father was 145 years old (11:26; 12:4). That means that Terah died when Abraham was 135 years old, and his half-sister Sarah 125 years old. Sarah herself died two years later (23:12), but the episode recounted immediately before her death has Abraham being told in detail about the descendants of his brother Nahor back in Haran, without any explanation. Terah's death is therefore the obvious impetus for report to be sent about the new clan leader and his legal heirs.
- Finally, Jacob's journey down to Egypt took place only ten years after his father Isaac's death and burial, explaining why he felt the liberty now as head of the clan to authorise a full departure from the land of Canaan (46:127). Joseph had earlier spoken of his homeland as "the land of the Hebrews" (40:15), 'Hebrews' meaning descendants of 'Eber' (cf. 10:21, 25). After Canaan's first ruler Shem died, Jacob and Esau being fifty years old (cf. 25:2734?), his great-grandson Eber would have been next in line to succeed him as ruler of Canaan, hence its alternative name. Eber passed this inheritance directly on to Isaac when he died (cf. 26:2829?), only eight years after Jacob had departed for Paddan-aram.

Isaac's own imminent succession might explain why he had felt an urgency to designate his own heir (27:12) a full fifty years before he actually died.

The coherence of the chronological framework of Genesis with many of its non-dated stories demonstrates that the recorded ages for the various individuals were far from arbitrary. Although such vast lifespans are quite foreign to our own modern experience, this ancient author treated them as entirely literal, and included various stories that are explicable only within this framework.

The moral and legal relevance of history

Even so, biblical authors were never interested in history purely for history's sake. Past events were recorded in order to speak of the activity of the living God, and to function as examples for the present audience. For example, one key point made by the author of Genesis is that elders maintain their authority over their descendants right up to their death, and their blessing is greatly to be sought after (cf. 48:1–49:28; 50:1521). This blessing may well offend passed-over siblings (4:39; 21:9; 27:41; 37:34), but he who receives it does so for the benefit of his whole family (50:2122) and, in the case of Shem's heirs, for the benefit of all humanity (3:15; 5:29; 9:2627; 12:3; 41:57).

To make this point clearer, the author of Genesis carefully structured his whole book using ten section headings. These emphasise his primary interest throughout in recording the legal heirs, or 'generations', of each successive group of humanity: Adam (5:1), Noah (6:9), his three sons (10:1) and then Shem in particular (11:10), Abram's father Terah (11:27), Ishmael (25:12) and Isaac (25:19), and finally Esau (36:1) and Jacob (37:2). In almost every stage the unique inheritance is passed on by a father 'blessing' a particular child or children, so when at the end of the book Jacob blesses not just one but all twelve of his sons (49:128), this clearly communicates that the whole nation of Israel is now the chosen 'heir' of humanity (cf. Exodus 4:22).

What does this legal inheritance mean practically, though? The first of the ten headings (2:4) makes the surprising point that the heir can claim authority over not just all mankind but even the cosmos as a whole, inheriting the blessing given to Adam and Eve (1:28; cf. 49:2526). The author therefore means to argue that Israel is uniquely authorised to bless all mankind with proper government and life-giving food, as his son Joseph nicely illustrated (41:57). Israel was in effect the appointed 'seed' of Eve, destined eventually to overcome the original curse on the earth caused by mankind's obedience to the serpent (3:15; cf. 4:25; 5:29).

History taught Israel how to understand not only God's sovereignty over nature but also more importantly the role that their historical heritage as a nation had destined them to play within God's world.

> “History taught Israel how to understand not only God's sovereignty over nature but also more importantly the role that their historical heritage as a nation had destined them to play within God's world.”

The chronology of Genesis 2–3

If the ten section headings start with the poetic parallelism in 2:4, does that mean that 1:1–2:3 was an introductory afterthought, or somehow less historical than the rest of the book? After all, it seems to give a conflicting account of creation. Take, for example, the different lengths of time given for creation. Recently the biblical scholar Hodge (2011) has shown quite emphatically that the singular word 'day' in Hebrew only ever refers to a literal day of twenty-four hours or less.[2] In that case, the introductory verse in 2:4 describes all that follows as part of the single 'day' in which God made earth and heaven. 3:8 mentions the 'wind of the day', the late afternoon when the breeze picks up and shadows are lengthening (cf. Song of Songs 2:17), which places the curses and expulsion of Adam and Eve in chapter 3 before the evening when a new day would start (cf. 1:5).

If chapters 2–3 depict creation as a single day but chapter 1 gives a sequence of seven days, is this a contradiction? Not if the 'day' of creation signifies the day of its completion (cf. 1Kings 6:9, 14; 9:10; Ezekiel 43:18). The sixth day of creation was the final day in which God did any creative activity (1:31–2:1) and on closer analysis the account of the day in chapter 2 corresponds closely to that of 1:2431.

As for the inconsistencies often pointed out, the vegetation created on Day 3 apparently had not included cultivated plants ('of the field' – 3:18), which needed a gardener (2:5). Mankind as a complete 'kind' was indeed created/completed after the animals (1:2427), when Eve was finally made and brought to Adam (2:1922). The only remaining inconsistency relates to the creation of birds, on Day 5 in 1:21 but on Day 6 in 2:1920. We saw in the first article how the author of Psalm 104 dealt with this apparent problem, but in any case he clearly did not consider it sufficient grounds to justify treating the two creation accounts as incompatible.

Only when the chronology of Adam and Eve's punishment is properly understood does its theological significance becomes apparent. By being permanently exiled on the sixth day from the source of life in the Garden, the man and woman did indeed 'die' as promised on the same day that they ate the fruit. They were unable to enjoy God's seventh day 'Sabbath' (cf. Deuteronomy 5:14), explaining why Noah's hopeful name means 'rest' (5:29), why the ark and the dove are both said to find 'rest' on the earth (8:4, 9), and why the aroma of Noah's sacrifice is 'restful' to God (8:21). Sabbath rest and new creation becomes a key theme in the rest of the Pentateuch (e.g. Exodus 16; 33:14; Leviticus 23, Deuteronomy 12:812).

Temple symbolism in Genesis 1–3

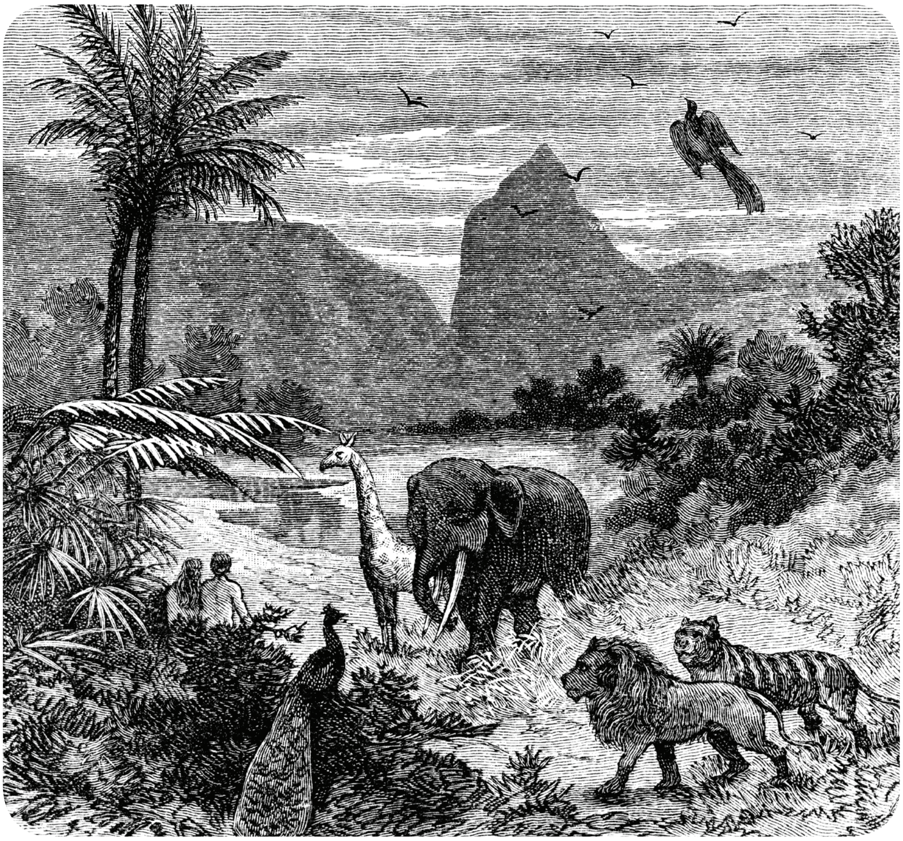
Missing out on the Sabbath is not the only significance of combining Genesis 2–3 with Genesis 1. A more fundamental message is detected when we recognise the priestly nature of both accounts.

Firstly, the large-scale view of Genesis 1:1–2:3 uses priestly language to envision creation as God's process of building a cosmic temple (compare similar expressions in Exodus 40:17-33), in which He finally places his own 'image' to represent His authority (Hodge 2009; Smith 2012). As with normal construction, pre-existing materials are used (waters, land under sea) and given a new functionality by being placed in proper relation to each other. However, occupants of the new spaces are not here depicted as being made from their surroundings (cf. 2:7, 19); on the contrary, chapter 1 puts great emphasis on the power of God's spoken word alone to separate or craft His creation. Just as light was clearly created ex nihilo, so the amorphous watery earth had presumably been made by God at some earlier point (cf. Job 38:411; Proverbs 8:2231).

Secondly, the specific description of the Garden of Eden in Genesis 2 and 3 also has many details that would sound temple-like to the ancient reader, including a garden, rivers flowing out, precious stones, a tree of life, and fearsome creatures guarding the entrance. In this account humanity is seen not so much as the 'image' representing the God, but as the priest, the 'servant' or 'minister' created to look after God's garden temple (2:15); hence the regulations for Adam about marriage and permitted foods (cf. Leviticus 21; Numbers 18:8-19).

In light of the priestly imagery throughout the creation stories, it is worth looking closer at the significance of the seven days of creation. Once again, because Genesis 2–3 is meant to be heard only within the general framework established in Genesis 1, its detailed description of a single day is understood to be the same as the sixth day of Genesis 1:24-31. Awareness of the priestly character of these accounts shows why it was so tragic that this particular Sabbath became spoiled.

> "Just as temples, marriages, or kingdoms were consecrated over seven literal days, so it would have been logical to an ancient Israelite audience that the cosmos itself had taken the same length of time to build, furnish and 'sanctify'."



Garden of Eden (illustration dated 1884). © andipantz, www.istockphoto.com

Seven days of consecration

The Bible records various examples of social institutions being consecrated over a seven day period, but also often upsets expectations by having the appointed leader of the institution fail at the very last moment before it is completed. For example, the first week consecrating the wilderness tabernacle and Aaron's priesthood were spoiled by the sin of Nadab and Elihu and their destruction (Leviticus 8:1–10:7; cf. Exodus 29:2937), Samson's week-long wedding feast was interrupted, never to be consummated (Judges 14:1020; cf. 15:16), and Saul's kingdom failed to be established because of his disobedience on the seventh day itself (1 Samuel 10:8; 13:114).

Just as temples, marriages, or kingdoms were consecrated over seven literal days, so it would have been logical to an ancient Israelite audience that the cosmos itself had taken the same length of time to build, furnish and 'sanctify' (2:3). The origins of the seven-day week cannot be traced to either the lunar or solar cycle, and it was evidently already established in Noah's day (Genesis 7:4, 10; 8:10, 12). It would not have been surprising to an ancient audience that the seven-day week had first been instituted back at the consecration of the world. For the nation of Israel, their first experience of Sabbath in Exodus 16 depended on God Himself working for six days to feed them with manna. When Sabbath observance became the fourth of the Ten Commandments shortly thereafter (Exodus 20:8-11), on the pattern of God's own rest after six days of creation, this would have naturally been understood in a similar way as literal days when God made preparations for His first Sabbath rest with humanity.

There is no conflict, therefore, between a symbolic seven-day period of consecration and a literal sequence of seven days. Whether in politics, religion, or even household affairs, everyone would have known the importance of completing a whole week to establish a new institution properly. The failure of mankind's first parents to follow instructions on the day they were created would amply explain why human relationships with each other, with animals, and even with the earth itself, were now shot through with pain, and why God's good and sacred creation was marred. God's appointed priest-king Adam, created as His 'image', had been personally responsible for completing the single week needed to consecrate the cosmos, so his rebellion incurred divine judgements of expulsion from the sacred Garden of Eden and a curse upon the earth itself.

As time went on, the priestly line of Seth, the 'son of God' appointed to continue the sacrifices of Abel (Genesis 4:25; 5:1, 3), started to corrupt themselves through intermarriage with daughters of the cursed line of Cain (the 'man' – 4:1; cf. 4:22; Ezra 9–10). As a result, the defiled earth-temple had to be entirely demolished by a Flood. After leaving the ark, Noah then successfully consecrated the new re-created earth by offering righteous sacrifices of 'clean' animals. It was not the holiness of surviving humanity (8:21), but only the obedience of earth's new priest-king, which won from God the promise that the sacred earth would never again be destroyed by a flood.

Canaan as consecrated land

The theme of consecrated land is then carried on throughout the book of Genesis and beyond, with Canaan being a new Garden of Eden. Canaan is granted to Shem as a permanent inheritance by the decree of Noah (9:2527), and when Abram is brought into it he finds it already ruled over by a priest-king Melchizedeq, who blesses him by the Possessor / Creator of heaven and earth (14:1822). Genesis 15 is full of allusions to creation, whether that be 'seed', stars in the heavens, being brought out from a land of origins to a place of inheritance (cf. 2:7-8), sacrifices of animals in 'pairs', so to speak, 'deep sleep' upon Abram, and a flaming torch (cf. 3:24). All of this is in response to Abram's decision not to take for himself the goods of the land (14:21–15:1), contrasting with Adam and Eve's taking of the fruit of the forbidden tree. He had made the same decision earlier with regard to the most fertile parts of the land, the well-watered 'circle' of the Jordan (cf. Proverbs 8:27) that was "like the garden of the Lord" (13:818).

Taking the historical symbolism further, the promise that Abram's descendants will return to claim the land when the 'iniquity of the Amorites' is complete (15:1316) is meant to parallel the Flood's destruction of the wicked, when the earth rejected its inhabitants (cf. Leviticus 18:2428). Israel was preserved from global famine in the 'ark' of the land of Goshen (45:511), and after waters of judgement destroyed their wicked Egyptian enemies (15:14; cf. Exodus 15:1-18; Psalm 74:12-17), they would eventually return to a cleansed land resembling the Garden of Eden (50:2425; cf. Deuteronomy 8:39).

Conclusion

Genesis 1–11 undoubtedly presents a disturbingly confrontational perspective, not just on human nature but also on the history of mankind and the cosmos, and even on naturalistic scientific conceptions of the world. However, we would be unwise to dismiss the author's views as non-empirical, mythical or primitive, presuming that these stories were simply invented to communicate deeper spiritual truths. He himself was not afraid to disagree with the arrogant claims of contemporary civilisations in his own day, believing that he was preserving a uniquely accurate record of human history in which chronology was essential for understanding the reasons for events.

Christian convictions in the authority of scripture have always referred to the original intentions of the biblical authors, and while we may find these hard to reconcile with secular opinions of our own day, it was never any less of a challenge for previous generations ever since it was first written. Further archaeological and scientific research may well confirm the value of the detailed historical record of Genesis, and when it does, it will be time for Israel, the wider Church, and the world to sit up and take notice. This is not just a dramatic adaptation of ancient 'science fiction'; on the contrary, the sovereign Alien who once created and then destroyed the earth with a Flood has not been sleeping, and still has designs on humanity (2 Peter 3:3-7). ■

Footnotes

[1] The following calculations rely on the chronology found in the standard Masoretic Text of the Hebrew Bible. For a compelling defence of this tradition, over and against the numbers found in the Greek Septuagint or Samaritan Pentateuch, see Williams (1998).

[2] Hodge himself does not believe the author of Genesis was trying to describe 'real time' in Genesis 1, despite arguing that 'day' in Hebrew never means a vague period of time (Hodge, 2011).

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Precambrian embryos and their relevance to the Cambrian Explosion

David J. Tyler

In 1998, Xiao, Zhang & Knoll dazzled the palaeontological world with spectacular fossil embryos from Doushantuo, China. To find soft-bodied embryos is noteworthy in its own right, but these specimens were from the late Precambrian (the early part of the Ediacaran Period) and some were described as belonging to animals. The search for animal ancestors before the Cambrian (when there was an explosion of animal life) has been intense – for their absence presented Darwin with a dilemma. He predicted that they would one day be discovered and palaeontologists have been searching for them ever since. Multicellular Ediacaran fossils have been found, but their affinities with Cambrian animals have been controversial. For example, one of the most widely cited examples (*Charnia* interpreted as a sea pen) did not stand up to critical scrutiny (Antcliffe and Brasier, 2007). Consequently, to find animal embryos in the early Ediacaran was deemed worthy of heralding. Stephen Jay Gould put pen to paper straight away, saying that "Fossils of tiny embryos 570 million years old may well be the greatest paleontological discovery of our time."

This interpretation was widely accepted, with research papers discussing their significance and textbooks explaining that the Cambrian Explosion problem has been eased, because ancestral animals did exist in the Ediacaran. More recently, Butterfield (2011) explained their implication like this: "Ever since Darwin there has been a disturbing void, both paleontological and psychological, at the base of the Phanerozoic eon. If his theory of gradualistic evolution be true, then surely the pre-Phanerozoic oceans must have swarmed with living animals – despite their conspicuous absence from the early fossil record. Thus, the 1998 report of fossilized animal embryos in the early Ediacaran Doushantuo Formation of South China was met with almost palpable relief."

However, several researchers considered the "animal" interpretation unconvincing. The fossilised characters regarded as diagnostic of animals have been found in other types of organism. Other features that have been observed are not "animal" at all. The first major challenge came in 2007, when Bailey *et al.* documented similarities with a modern giant sulphur-oxidising bacteria going by the name *Thiomargarita*. However, there were still problems: this interpretation explained some, but not all, of the data. What was needed was more fundamental research in order to evaluate alternative hypotheses. This has been happening over the past few years. The inner structure of the embryos have been probed using Synchrotron X-ray tomographic microscopy; and, using experimental taphonomy, researchers have assessed what realistically can be preserved of biological tissue during fossilization. This has allowed them to distinguish embryo tissues from diagenetic mineralisation.

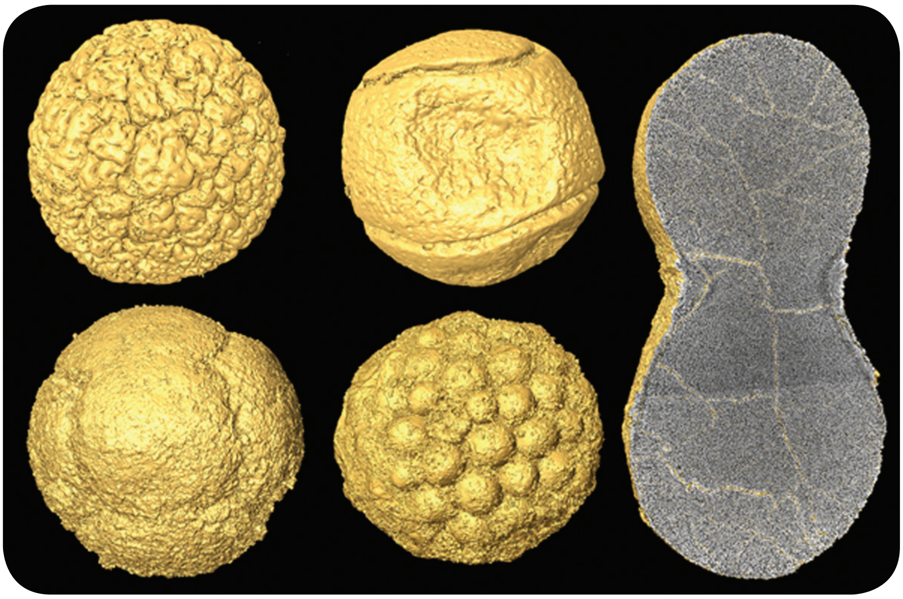
Hagadorn *et al.* (2006) used X-ray computed tomography and reported internal cellular structures that were suggested to be "fossilized nuclei, spindle bundles, or other organelles". This boosted the "animal" interpretation, but it was also consistent with the giant sulphur bacteria hypothesis.

Then came a bombshell. Huldtgren *et al.* (2011) showed internal features incompatible with multicellular metazoan embryos, instead, there was a good fit with the embryos belonging to protists, and the observations match modern-day structures producing "propagules for dispersion".

In parallel with this research, an experimental taphonomy study was published by Cunningham *et al.* (2012). This tested the hypothesis that the embryos should be identified as giant sulphur bacteria. Distinct differences were found between the experimentally preserved and the fossilised forms. The authors concluded that the hypothesis must be considered falsified. Kaplan's News report in *Nature* had this to say:

> "Of the 450 fossils scanned, 14 were found to contain structures that look like nuclei. In one of these specimens, three of the eight structures even have the elongated or dumb-bell shape of modern nuclei about to replicate. This hints that the organism died during cellular division. We were enthralled to find nuclear division preserved by fossilization. It confirmed that the fossil organisms were not bacteria, but we soon realized that they were not like animals either, as animal nuclei tend to lose their contours during cell division, and these nuclei did not," says Bengtson.

The expertise developed in this experimental approach to fossilisation has extended the knowledge base for distinguishing between preserved biological material and diagenetic mineralization (post-depositional changes). This has allowed a more general evaluation of extant fossil material. One casualty has been *Vernanimalcula guizhouena,* also from the Doushantuo Formation, which has been interpreted as the earliest bilaterian animal. The significance of finding a bilateran animal is in the evidence it provides of complexity: the animal has body symmetry with an upside, an underside, a front end and a back end. Most of the animal phyla are bilaterans, but not sponges, cnidarians, placozoans and ctenophores. There was great interest in the discovery of *Vernanimalcula guizhouena,* because the timescale for bilateran evolution prior to the Cambrian Explosion was significantly extended. Now, however, the diagnostic animal features are regarded as the products of diagenesis (Bengtson *et al.,* 2012).



Computer reconstructions of Doushantuo fossils. On the left are four embryo-like specimens, on the right is a peanut-shaped form with tens of thousands of cells. Images not to the same scale.
© John Cunningham, www.palaeontologyonline.com/articles/2012/fossil-focus-animal-embryos

In January 2013, the writer attended a lecture on the Doushantuo microfossils given by Dr John Cunningham of the University of Bristol and co-author of several of the research papers cited above. The lecture covered the material discussed above, and more beside. The lecture abstract gave the conclusion that "there is currently no convincing evidence for advanced animals with bilateral symmetry in the Doushantuo biota". This particular quest for animals preceding the Cambrian Explosion has drawn a blank.

Needless to say, Darwin's dilemma remains in full force. "If the theory be true," Darwin wrote in *The Origin of Species* (6th Edition, 1872), "it is indisputable that before the lowest Cambrian stratum was deposited long periods elapsed … [in which] the world swarmed with living creatures." Yet Darwin knew that "several of the main divisions of the animal kingdom suddenly appear" in the Cambrian, and he called this a "serious" problem which "at present must remain inexplicable; and may be truly urged as a valid argument against the views here entertained." ■

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Glossary

Bilateran animal: An animal with bilateral symmetry, having a front and a back end, and an upside and a downside.

Diagenesis: The process of chemical and physical change in deposited sediment during its conversion to rock.

Protist: Single-celled organisms, classified in the kingdom Protista, that may be free-living or aggregated into simple colonies.

Taphonomy: The branch of palaeontology concerned with processes of fossilisation.

Temperature Acclimation in Fish Muscles

Hans Degens

In the Northern and Southern hemispheres of the earth there are large seasonal variations in temperature. In southern England, for instance, summer temperatures may be as high as 25°C and winter temperatures as low as -5°C. These fluctuations of temperature are somewhat dampened in water, but can nevertheless be significant, particularly in shallow ponds. The impact of changing temperatures on fish muscle, such as those of the common carp (*Cyprinus carpio L.*), is potentially problematic as all metabolism and the contractile properties of muscle slow down with decreasing temperatures. Although fish adapt to this by reducing their activity levels, they remain active even when the water reaches temperatures as low as 0-4°C. How do fish cope with these seasonal variations in temperature to maintain their activity levels? The answer is that they exhibit seasonal changes in the composition of their muscles that ensure optimal muscle function throughout the year, a phenomenon called 'temperature acclimation'.

Muscle power and temperature

Skeletal muscle is indispensable for locomotion, respiration and maintenance of body posture. This does not only apply to humans but to all vertebrates, including fish. Muscles perform their function by shortening and producing force at the same time. Lifting an object from the ground, for instance a suitcase when you board a train, is the result of the simultaneous shortening and force generation of the arm muscle (biceps). While a light suitcase can be lifted quickly, daily experience tells us that lifting a heavy suitcase occurs much slower; in other words, the heavier an object, the slower the lifting. At the level of the muscle this is seen as decreasing velocities of shortening with increasing force; the force velocity curve (See Figure 1A).

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> During daily life activity muscles perform mostly shortening contractions. In that case it is much more important to know the power generating capacity of the muscle rather than the force generating capacity.

During daily life activity muscles perform mostly shortening contractions. In that case it is much more important to know the power generating capacity of the muscle rather than the force generating capacity. Power can be calculated as follows:

$$W\ (J\cdot s^{-1}) = F\ (N) * V\ (m\cdot s^{-1})$$

where W is Watts (in $J\cdot s^{-1}$ and 1 J = 1N*m); F is Force (in N) and V is velocity (in $m\cdot s^{-1}$). Based on this equation we can now calculate the power generating capacity of the muscle by multiplying the force with the velocity in the force-velocity relationship. As said above, in Figure 1 it can be seen that 1) the force a muscle can generate when maximally activated decreases with the speed of shortening and also that 2) peak power is generated at around 30% of the maximal force generating capacity of the muscle.

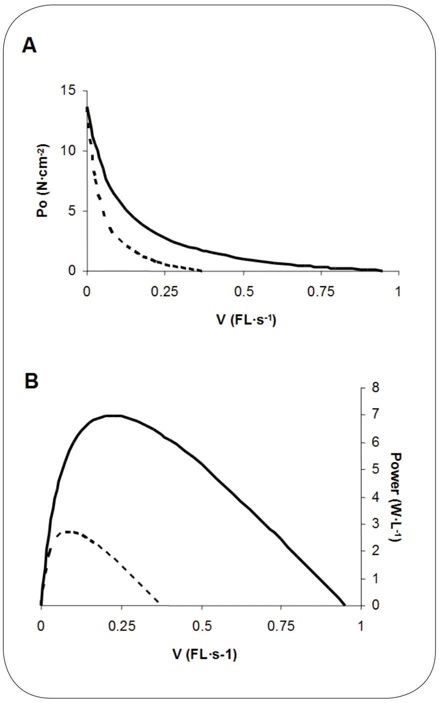

Figure 1: A) The relationship between force and velocity in maximally activated muscle (fibres). The solid line represents a fast (type II) fibre with a much higher maximal shortening velocity (V) than a slow (type I) fibre, represented by the dotted line. The maximal force generating capacity does not differ between slow and fast fibres. **B)** The relationship between shortening velocity and power in a fast (solid line) and slow (dotted line) fibre. It can be seen that fast fibres are more powerful than slow fibres. The difference between the solid and dotted line is also representative for the effect of temperature (high temperature solid line; low temperature dotted line). A decrease in temperature thus slows the fibre (muscle) and reduces the power it can generate.

A muscle is build up of thousands of individual muscle fibres. Roughly speaking two fibre types can be distinguished; fibres that have a relatively slow velocity of contraction (type I fibres) and fibres with a high maximal shortening velocity (type II fibres) (Gilliver *et al.,* 2009). In figure 1 the functional properties of a fast type II fibre maybe represented by the solid line and that of a slow type I fibre as the dotted line. It can be seen that slow fibres are much less powerful than the fast fibres (Fig. 1B). However, the slow fibres are packed with mitochondria, the energy factories of the cell, and can maintain activity for long periods of time. They are therefore suitable for slow movements where the fast type II fibres would be functioning far below their optimum. In fact, during slow swimming, or walking for humans, the slow type I fibres are recruited and contract at a velocity at which they produce peak power. Only during explosive movements like running or fast swimming to escape a predator the fast fibres are recruited. This appears also to be energetically the most efficient way to recruit the different muscle fibres, particularly where the slow fibres are just too slow to contribute to explosive movements (Rome *et al.,* 1988), and may even cause drag.

The functional properties of muscle fibres, and hence the muscle as a whole, are temperature sensitive, where in particular the maximal shortening velocity and to a lesser extent the force generating capacity of a fibre decreases with decreasing temperature (Johnston *et al.,* 1985). The impact of temperature on the power generating capacity is illustrated in figure 2; one could say that at low temperature the fast type II fibre starts to behave like a slow type I fibre. Thus, not only is the peak power reduced but also the velocity at which peak power is produced. And this is the problem fish face during winter.

Energy metabolism

The heat generated during a campfire comes from the burning wood. Burning is nothing else than the reaction between, in this case, wood with oxygen; it is therefore called an oxidative reaction. Also in the cells oxidation (or burning) of fats, carbohydrates and proteins take place. This process is tightly controlled so that not all the energy substrates are quickly and uncontrollably burned, but only when the cell needs energy. While in a campfire all the energy in the wood is released as heat, in the cell it needs to be liberated in a way that it can be used for useful processes, such as muscle contraction. You could compare it with the electricity generated in a power plant from the burning of coal; the electricity can be used for many processes such as lighting, lawn mowing, shaving, cooking etc. In the cell the energy currency is not electricity, though the body makes use of electricity in all cells for sending signals, but adenosine tri-phosphate (ATP).

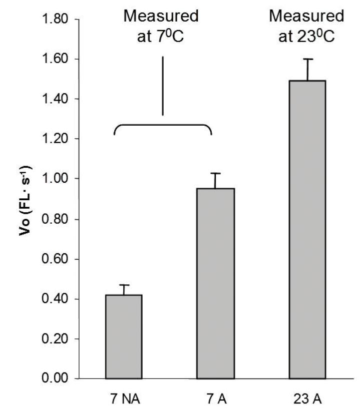

Figure 2: The maximal shortening velocity (Vo) of slow muscle fibres from the carp (*Cyprinus carpio, L.*) measured at 7°C or 23°C. 7 NA: measured at 7°C but not acclimatised; 7A: measured at 7°C and acclimatised; 23 A: measured at 23°C and acclimatised to 23°C. Data from Johnston *et al.,* 1985.

The capacity for oxidative energy metabolism is an important determinant of skeletal muscle fatigue resistance or endurance (Degens and Veerkamp, 1994). Indeed, fish recruit their slow-oxidative type I fibres during normal swimming and only when a rapid escape from a predator, or catching of prey, is required are the fast type II fibres recruited that have a metabolism that can rapidly produce ATP without the use of oxygen, but is also exhausted rapidly (Rome *et al.,* 1988).

Oxidative ATP generation requires an adequate supply of oxygen. The oxygen is delivered to the muscle via the microcirculation and it is thus not surprising that a muscle or muscle region with a high oxidative metabolism has a dense capillary network (Hudlicka *et al.,* 1988). At lower temperatures the rate of metabolic reactions decreases. The slower

Goldfish. © Irochka_T, www.istockphoto.com rate of enzyme activity in aerobic metabolic pathways inevitably results in a slower rate of aerobic ATP generation, while at the same time the rate of diffusion of oxygen and metabolites is decreased.

Adaptations of muscle functional properties to low temperature

During acclimation to low temperatures the myosin ATPase activity, the prime determinant of the maximal shortening velocity of a muscle (fibre) (Barany, 1967), is also increased (Heap *et al.,* 1986, Sidell, 1980). As a consequence of this increase in myosin ATPase activity the maximal shortening velocity (Figure 2) and the ability to generate power of cold-acclimatised muscle is higher than that of non-acclimatised fibres at low temperature (Johnston *et al.,* 1985). Since the speed at which the fibres within the muscles can contract is increased it is no surprise that the muscles from cold-acclimatised fish have much higher rates of force development and relaxation than those from warm-acclimatised gold fish at low environmental temperature (Heap *et al.,* 1986). The acclimation does not entirely normalise the functional properties to those observed in warm-acclimatised muscles at high environmental temperatures (Figure 2) but they do attenuate the slowing and loss of power that would otherwise significantly hamper the activity of the fish and in particular burst performance at low temperatures (Johnston and Temple, 2002).

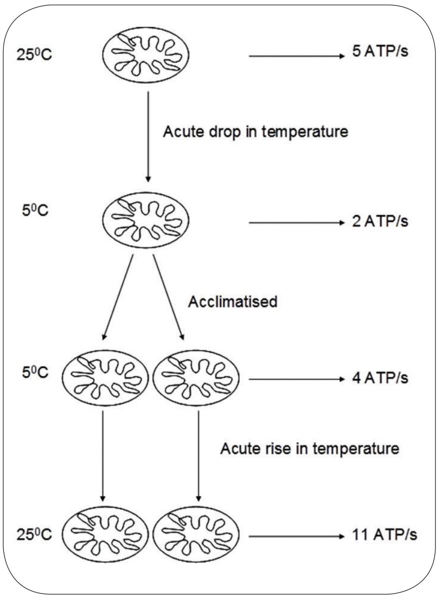

Figure 3: Illustrated is the maximal (arbitrary) rate of aerobic energy generation and how temperature and temperature acclimatisation do affect this. In the top panel the rate of aerobic ATP generation is given for a given certain number of mitochondria (indicated in the cartoon by 1 mitochondrion). In the panel below is illustrated that an acute drop in temperature results in a reduced rate of ATP generation, which is to some extent, but not entirely, compensated for by new-formation of mitochondria (here a doubling). If these mitochondria in cold-acclimatised fish are then suddenly exposed to a higher temperature they generate ATP at a higher rate than expected from the number of mitochondria, due to changes in the rate of individual enzymes in the mitochondria. This illustrates that temperature acclimatisation of aerobic energy metabolism is not only due to an increase in the abundance of mitochondria, but also the specific activity of the mitochondria.

Adaptations of energy metabolism to low temperature

In the goldfish (*Carassius auratus, L.*) the abundance and activities of enzymes involved in oxidative metabolism are elevated after cold acclimation (Egginton and Sidell, 1986, Johnston and Dunn, 1987, Johnston *et al.,* 1985, Sidell, 1980), while those that are used for anaerobic energy generation are diminished (Sidell, 1980) or unaltered (Johnston *et al.,* 1985). In the muscles (Heap *et al.,* 1986, Sidell, 1980) not only the abundance of these enzymes in individual fibres increased, but also the number of muscle fibres within the muscle that have a high oxidative metabolism (Jones and Sidell, 1982). It appears that in particular the capacity of fatty acid oxidation is elevated during cold acclimation (Jones and Sidell, 1982). The enhanced oxidative capacity also increases the demand for oxygen, which is compromised due to the lower rates of diffusion at low temperatures. The formation of new capillaries does help to overcome this problem (Johnston and Dunn, 1987, Egginton *et al.,* 2000) as does the increase in intracellular lipid (Egginton et al., 2000) and myoglobin that help facilitate intracellular oxygen diffusion (Heap *et al.,* 1986), where the latter also acts as an intracellular oxygen store (Wittenberg, 1965). The increased abundance of mitochondria also reduces the diffusion distances of metabolites and thus compensate for the reduced rate of diffusion of metabolites within the muscle cells at low temperatures (Egginton and Sidell, 1986).

Although all these adaptations increase the capacity of oxidative ATP generation at low temperatures, the maximal rate of ATP generation at low temperature in cold-acclimatised fish remains lower than that of warm-acclimatised fish at high environmental temperatures as illustrated in Figure 3. As a result of these adaptations, the decline in the rate of oxidative energy generation that would otherwise occur at low environmental temperatures is attenuated and ensures that the animals can maintain near normal swimming behaviour at low temperatures.

Factors that play a role in temperature acclimation

The increased oxidative capacity during cold-acclimation is not solely due to an increase in the abundance of aerobic enzymes, but also the rate at which individual enzymes work may increase (Johnston and Dunn, 1987). Changes in pH and substrate/modulator concentrations and phosphorylation status of the enzymes all may acutely affect enzyme activity without a change in the abundance of the enzymes (Johnston and Dunn, 1987). Another acute compensation to decreased temperature is the recruitment of fast fibres at lower swimming speeds so that swimming at cruising speeds remains possible even after an acute drop in temperature. This may, however, come at the expense of the earlier onset of fatigue as these fast fibres have a lower endurance (Johnston and Temple, 2002). Clearly, the acclimation of the muscle to lower temperatures described in earlier paragraphs does ensure that the recruitment of fast, but fatigable, fibres occurs at higher swimming speeds than in non-acclimatised fish and thus reduces the fatigability of the acclimatised fish muscle during normal swimming (Johnston and Temple, 2002).

Evolutionary considerations

Although thermal plasticity is not limited to fish and also occurs in other poikilotherms (organisms that cannot regulate their body temperature by metabolism), such as insects and to lesser extent amphibians, there has been surprisingly little speculation in the literature about the evolutionary origin of thermal acclimation. In addition, studies so far have not shown a clear cut survival benefit of thermal acclimation

(Johnston and Temple, 2002). Yet, the wide occurrence in the animal kingdom and the considerable cost of temperature acclimation for the organism suggest that it must have a significant benefit. As discussed in (Johnston and Temple, 2002) it is conceivable that thermal acclimation to low temperatures enhances the ability of the animal to escape predators and catch prey.

One of the signals must be a change in temperature itself as even in laboratories where the light-dark cycle, which would also show seasonal variation, is not changed temperature acclimation still takes place. How this change in temperature translates into the process of temperature acclimation is, however, not known and this certainly is an area for future research.

Whatever the mechanisms and signals that cause temperature acclimation of muscle and other tissues, it is a remarkable phenomenon. The process occurs in such a way that the locomotory capacity and physiology of other tissues (not discussed here) remain fairly constant throughout the year despite significant changes in environmental temperature. This acclimation is realised by remarkable in-build (muscle) plasticity. Here we thus have an example of a relatively rapid adaptation to changing environmental circumstances within the life-time of an organism. The coordinated change in metabolism, morphology, as reflected for instance by altered capillary number, and contractile machinery resemble those occurring after training. The fact that these responses are coordinated is intriguing and suggests that a designer envisaged that poikilotherm animals require such a coordinated response to seasonal variations in temperature to maintain a near normal activity pattern throughout the year.

Finally, these rapid responses within an organism are a sign of the versatility of the organism to adapt to changing environments, such as here to seasonal variations in temperature. They are within-organism changes and are no evolutionary process; the genetic constitution of the organism stays unaltered. This plasticity also precludes the impact of natural selection to cause directional changes. In fact, the seasonal adaptations are readily reversible and any fixation of a low- or high-temperature phenotype would in fact reduce the fitness of an organism. Therefore, the ability of poikilotherm organisms to adapt to seasonal variations (in temperature) is incompatible with evolution. ■

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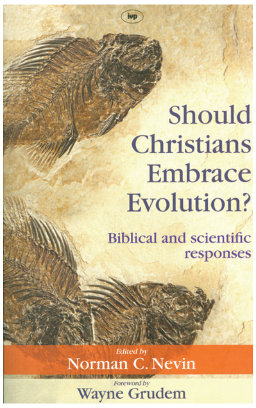
Book Review
Should Christians Embrace Evolution?
Biblical and Scientific Responses

Norman Nevin *et al.*
IVP, Nottingham, 2009. 208 pp.
ISBN 978-1-84474-406-0 **£11.99**

Reviewed by Professor Colin Reeves


ivp
Should Christians Embrace Evolution?
Biblical and scientific responses
Edited by
Norman C. Nevin
Foreword by
Wayne Grudem

The publication of Denis Alexander's book *Creation or Evolution: Do We Have to Choose?* has predictably given rise to many responses. This one is in the form of a book, edited by an eminent biologist, Norman Nevin, which contains a set of critiques that respond to different aspects of Alexander's book, although the answers often have a broader purpose as well. Multi-author books tend to be uneven, and this is no exception. Some of the chapters are of a very high standard, but there are also a few whose relevance is less obvious, or whose writing style is likely to cause difficulties.

The Preface does an excellent job of outlining the main issues. Perhaps it would have been helpful to say a little more about each contribution and what its focus is. As Alexander's book was clearly the catalyst for this project, a statement as to what particular issues are being addressed in each chapter would have been very useful. As it is, readers are left to work this out for themselves – not too hard, most of the time, but in a couple of places the relevance is a little obscure.

Chapter 1 (Alistair Donald) gives a concise and clear historical overview of Christian responses to Darwinism, and lucidly outlines the main theological problems caused by theistic evolution.

Chapter 2 (Alistair McKitterick) deals with one of the key assumptions underlying Denis Alexander's argument – that Genesis is *merely* a polemic against Babylonian ideology – and comprehensively demolishes it. Far from Genesis being an anti-Babylonian tract, which can only be interpreted in the light of contemporary Near Eastern myths, it is intended to be a chronological and historical account of the beginnings of God's covenant dealings with mankind. McKitterick's argument manages to be precise in technical terms, and yet also clear to follow for the non-academic layperson.

Chapter 3 (Michael Reeves) on the necessity for a historical Adam and Eve who were the first ancestors of all mankind is equally unambiguous. He argues convincingly that the New Testament could hardly be clearer in its textual assertion that Adam is a real historical man, the father of all the human race; moreover its theological development explicitly requires this to be the case. Alexander's proposal for understanding Adam as *homo divinus* is incoherent in its own terms, and brings serious theological problems in its train. Furthermore, it is not sufficient to posit a means by which Adam's historicity is preserved, as Alexander tries to do. If he was not also the father of all mankind, the theological problems remain. Reeves also points out that Alexander's model leads to a God who acts arbitrarily and whimsically – an argument that could perhaps have been further developed.

Chapter 4 (Greg Haslam) on the Fall and Death is also solid work. There is inevitably some overlap with the previous chapter, but Haslam presents a passionate defence of the traditional biblical doctrine of the Fall, and leaves no doubt as to its incompatibility with theistic evolution. He shows that Paul's development of the doctrine of salvation depends on the analogy and contrast between Adam and Christ. Darwinism is not a peripheral issue: accepting it puts in doubt the very heart of the Christian gospel.

Chapter 5 (David Anderson) is again impressive, albeit that again the argument overlaps with previous chapters. Anderson's analysis is withering in places, but nonetheless fair. He provides a forensic dissection of the theological consequences of Alexander's proposal for our understanding of the Fall, the Incarnation, the Cross and the World-to-come. The relevance of eschatology to our understanding of creation is a somewhat neglected theme, so it was good to see it discussed here, to supplement a brief allusion in chapter 4.

After these chapters, the next three are a little weak in comparison. **Chapter 6** (Andrew Sibley) is concerned with the implications of theistic evolution for our understanding of God's nature and character. However, the preamble meanders and the argument is diffuse. The style is awkward too: premises for his arguments accumulate inexorably, but take so long that when the conclusion arrives we have forgotten where we started. Similarly, citations are piled on one another without always being properly connected. This is a pity, as there is some valuable material here (e.g., on the relationship of revealed truths to physical events in history, or his engagement with Polanyi's writings), but a lot of work is required of the reader to uncover it. It was also rather unsettling to find Coleridge, whose ideas were so influential in *undermining* the traditional approach to reading scripture in the 19th century, quoted in support of Sibley's argument. There is also something of a missed opportunity: this would have been a good place to develop Reeves's point about God's character, that the consequence of the capricious God resulting from Alexander's model is a theology that does not support science either. So Alexander's model not only compromises the gospel, but also subverts what nearly everyone agrees was the historical basis for the development of science!

Chapter 7 (RT Kendall) is good in itself, easy to read and cogently argued – perhaps the chapter that would resonate most with the layperson. As usual with Kendall, there are some thought-provoking insights, but it's clearly (and acknowledged to be) taken from another work, and it lacks references. Ideally this chapter could have done with some editorial stitching to integrate it better. This is, of course, a general downside of multi-author books.

Chapter 8 (Steve Fuller) is a conundrum. It has quite a lot of academic jargon, and is not easy reading. His analysis of the irrelevance of Darwinism to the practice of science is good, and this chapter is the only place where theodicy is tackled explicitly. (Maybe it would have come better from an evangelical theologian, though.) His emphasis on the biblical roots of science is also highly relevant.

But his introduction of the concept of "Liminal Christians" (who are, almost by definition, not actually Christians) is likely to be controversial, and may prove to be a distraction. Fuller's idea is that people who are "below the threshold [limen]" of Christianity nevertheless share certain common ground – in particular, the idea that human beings are in some sense "above" the rest of creation, which makes them instinctively suspicious of Darwinism. Indeed, this suggests a possible answer to the problem that provokes Darwinians no end – why don't "the people" believe us? Politically, Fuller believes it should be possible to detach such people from supporting Darwinism.

The basic idea is interesting, once you get past the novel terminology, and could be recast in more conventional biblical categories. I am somewhat reminded of the apologetics of Cornelius Van Til, who, while rejecting the idea of "common ground", also (following Calvin) insisted that all men have a *sensus deitatis* – a knowledge of God, and therefore of themselves as God's image-bearers. At some level, man does know who he is, but is in epistemological denial, suppressing this knowledge on the basis of (what he presumes is) autonomous human reason. This denial is more conscious in some than others, so perhaps we might see the reflex refusal by many non-believers to accept the Darwinian conclusion that human life is not special as a consequence of the *sensus deitatis*.

Chapter 9 moves to the scientific questions raised by Alexander's model. What is it about the science that requires that we jettison centuries of theological reflection on the text of Genesis? The general approach of all the authors of this chapter is clear: there is considerable exaggeration in Alexander's interpretation of the data and a refusal to consider alternatives, while the Darwinian interpretation of biological data does not in any case match the latest science. Although the authors put it more tactfully, the suggestion is that Alexander is out of touch and out of date.

9A (Norman Nevin) on homology sets the tone. What Darwin thought to be one of his strongest arguments has been undone by the discoveries of molecular biology and genomics. Homologous phenotypic functions are not necessarily produced from homologous genes, while at the same time such genes may produce different functions.

In **9B** Nevin continues with a survey of the (lack of) evidence for Darwinism in the fossil record, moving on to give particular attention to the supposed evidence – strongly emphasized by Alexander – represented by "fossil" genes. Again, this Darwinian "proof" is based on outdated thinking – recent discoveries confirm that so-called junk DNA has function, so that commonalities can be better explained by common design rather than common descent.

In **9C** Geoff Barnard considers some of what Alexander alleges is evidence for human/chimpanzee descent from a common ancestor. Accepting the interpretation of a fused chromosome in the human genome does not in itself say anything about a supposed common ancestor. In order to make his point, Alexander has to ignore a wealth of evidence as to the *differences* between chimp and human DNA.

Chapter 9D (Andy Macintosh) deals with the crucial issue of information. Random mutation and natural selection is not a mechanism for increasing information, as is required by Darwinism. Furthermore, Macintosh argues, thermodynamic principles actually forbid it, and arguments that assume energy *per se* is all that is needed to increase information, independently of designs ('machines') to make use of it, are mere hand-waving. This is not exactly new material to those who read the evangelical press, but it is well-argued, and highly relevant to the thesis of this book.

Chapter 10 (Geoff Barnard again) expands on his analysis (in 9C) of the common ancestry thesis in the light of modern genomics, considering several specific arguments for the alleged shared ancestry of chimps and humans – arguments that rely on the occurrence of what are supposed to be pseudogenes, transposons and retroviral insertions. Barnard argues that the data are far from presenting a simple and compelling case; Alexander has been highly selective in his use of the data, ignoring anything that does not fit his argument. Moreover, what is known of the functional status of pseudogenes, transposons etc is in a state of flux; it is by no means certain that they are genetic fossils. Barnard has produced a thoughtful and persuasive case.

Chapter 11 (John Walton) demonstrates in a compelling way the flimsy nature of the argument for the origin of life (OOL) itself from mere physics and chemistry. This is not merely a critique of the tired old 'primordial soup' scenario; Walton also covers the RNA world, evolutionary algorithms, and theories of self-assembly and self-organization. This is an excellent summary of various OOL scenarios and their fatal shortcomings, although he could have interacted more specifically with Alexander's statements in this connection, which are seriously misleading.

The **Conclusion** (Phil Hills and Norman Nevin) is robust and clear. On the one hand, while we should have a high regard for science, we need to recognize its limits and its provisional nature. On the other hand, we cannot re-interpret isolated sections of the Bible without regard to what this might do for the coherence of the Bible's whole 'story-line'. The tone is courteous but pulls no punches, and the final statement leaves no room for doubt.

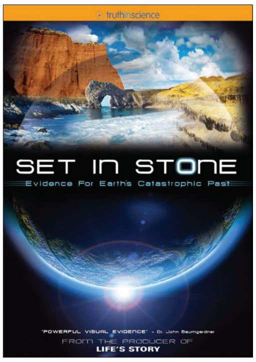
In summary, this is a valuable book, with many chapters that will repay concentrated thought and study. I suspect that it was put together quite hastily in the interests of immediate relevance, and there are areas where the arguments could have been made tighter and the material better integrated, but it is still a valuable resource. This is no 'God-of-the-gaps' argument, being based squarely on what we do know scientifically, and standing on the results of two millennia of Christian reflection on the most basic doctrines of the faith. Rather, it is theistic evolution that relies on a 'Darwinism-of-the-gaps' for its scientific arguments, and departs seriously from the Christian gospel. It probably will not convince theistic evolutionists: RJ Berry's review – or diatribe – in *Science and Christian Belief* (Vol.22, pp.207-8) suggests that at least some theistic evolutionists still prefer to pour lofty scorn rather than engage with the arguments. But for the puzzled Christian who is not sure what is at stake this book should prove very helpful. ■

DVD Review
Set in Stone

Truth in Science, 2012.
£12.95

http://www.truthinscience.org.uk/tis2/index.php/resource-pack-mainmenu-92.html

Reviewed by David J. Tyler

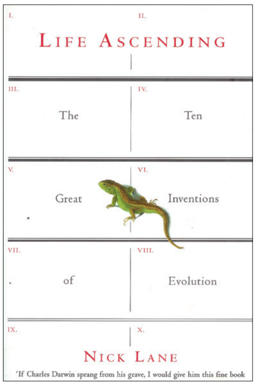

truthinscience
SET IN STONE
Evidence For Earth's Catastrophic Past
"POWERFUL VISUAL EVIDENCE" - Dr. John Baumgardner
FROM THE PRODUCER OF
LIFE'S STORY

This DVD provides a major challenge as it informs the understanding of viewers. The challenge is to deeply held convictions that we can reconstruct the geological history of our island by reference to modern-day processes. There are historical and intellectual roots to the consensus approach that prevails in school and university textbooks. These roots go back to social cultures and philosophical stances adopted by the Victorians. We see the world through their eyes to this day. By visiting various locations around the UK, and by looking at evidences found in the rocks, the presenters demonstrate that alternative perspectives are not only possible but are necessary to do justice to the data. My interest in these issues has led me to visit all the locations featured in the DVD – with the exception of Giant's Causeway. However, I have seen similar basalt flows on Mull and on Skye. The presenters do a good job in pointing out relevant data and showing that the present is not the key to the past. Over the years, I have heard geological speakers at professional meetings bring out all the radical ideas that viewers encounter in the DVD. The difference is that these speakers consider geological history to be long periods of relative quiet punctuated by catastrophic events. In this, they follow Professor Derek Ager in thinking that earth history is like the life of a soldier: 'Long periods of boredom and short periods of terror'. This DVD finds that the evidence for the long periods of time is largely lacking. The evidence is on the side of catastrophism. The publisher explains it this way: "Were the rocks around us formed slowly and gradually - or suddenly during catastrophic events? Did the history of the world unfold over vast eras of time or much shorter periods? And what do the rocks really tell us about the geological history of our world?" This DVD has evidence-based answers and has the potential to do much good in the world of education. Students find stimulus in questioning alternative explanations of the data. The extensive references to literature in the transcript booklet will be of considerable value with follow-up study – helping budding geologists feel more confident that they will not be asking stupid questions if they continue to examine evidences for the Earth's catastrophic past. ■

Book Review
Life Ascending
The Ten Great Inventions of Evolution

Nick Lane
Profile Books, London, 2010. 352 pp.
ISBN 978-1-8619781-8-9 **£9.99**

Reviewed by Hans Degens



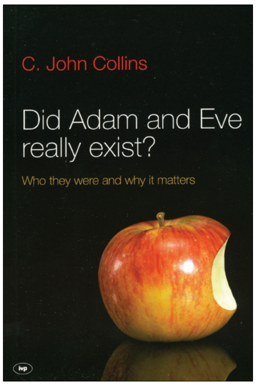
This book gives an excellent overview of current evolutionary thinking on ten key issues for modern biology. The ten 'inventions' of evolution are 'The origin of life', 'DNA', 'Photosynthesis', 'The complex cell', 'Sex,' 'Movement', 'Sight', 'Hot blood', 'Consciousness', and 'Death'. All of these are indeed very important 'inventions' and determine the outlook of life as we see it around us. The author possesses a great deal of knowledge about each of these subjects and I recommend reading this book to get an overview of the current thoughts in evolutionary biology. The author critically examines short-comings of past and current theories and comes up with possible solutions for new evolutionary theories. Many of these have some base in observations, but others are highly speculative. Chapter 1, for instance, deals with the origin of life, or more specifically the origin of metabolism. While evolutionary explanations are put forward, it is clear from the text that quite a degree of complexity had to arise before life could even begin to evolve. Indeed, only the existence of replicators makes natural selection possible. While the author admits that there is currently no generally accepted theory for the origin of life, he also makes clear that metabolism makes use of inherent properties of the chemicals involved in the chemical reactions in living organisms. It has all the hall-marks of design. Another example is the discussion of photosynthesis. The author acknowledges that even today we are not able to generate hydrogen and oxygen out of water by the action of light (though we may in the near future). Yet, he still describes an evolutionary scenario for the origin of this important process.

I can imagine that for evolutionists these scenarios will have a strong appeal, as the ideas are put forward convincingly. They remain, however, highly speculative. Overall, it is a book worth reading if only to get an up to date insight in the current thoughts among evolutionary biologists. That this book is highly regarded by the secular scientific establishment and may become influential in guiding the development of new research proposals into evolution is reflected by the fact that on the 21st October 2010 the author received the prestigious 'Royal Society Prize for Science Books'. Maybe, for us creationists it therefore ranks as a 'must read' to stay up-to-date with current evolutionary thinking. ■

Book Review
Did Adam and Eve really exist?
Who they were and why it matters

C. John Collins
IVP, Nottingham, 2011. 192 pp.
ISBN 978-1-8447-4525-8 **£9.99**

Reviewed by Ray Trainer

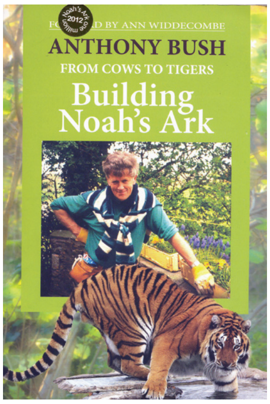

C. John Collins
Did Adam and Eve really exist?
Who they were and why it matters
ivp

This is a helpful book coming from a theistic evolutionist who is honestly and openly grappling with the implications of taking the Bible seriously as the word of God in its interaction with both biblical studies and modern science. I do have concern over the potential consequences of some of the statements Collins makes and also wish he had gone further with the conclusions he reaches, but nevertheless I commend the book as both thought-provoking and constructive in the current debate on the historicity of Adam and Eve. Clearly, Collins should be read with discernment and is not for those confused by or struggling with these issues. ■

Book Review
Building Noah's Ark
From Cows to Tigers

Anthony Bush
Moatwell Press, 2012. 400 pp.
ISBN 978-0-9572021-0-8 **£7.99**

Reviewed by David Tyler

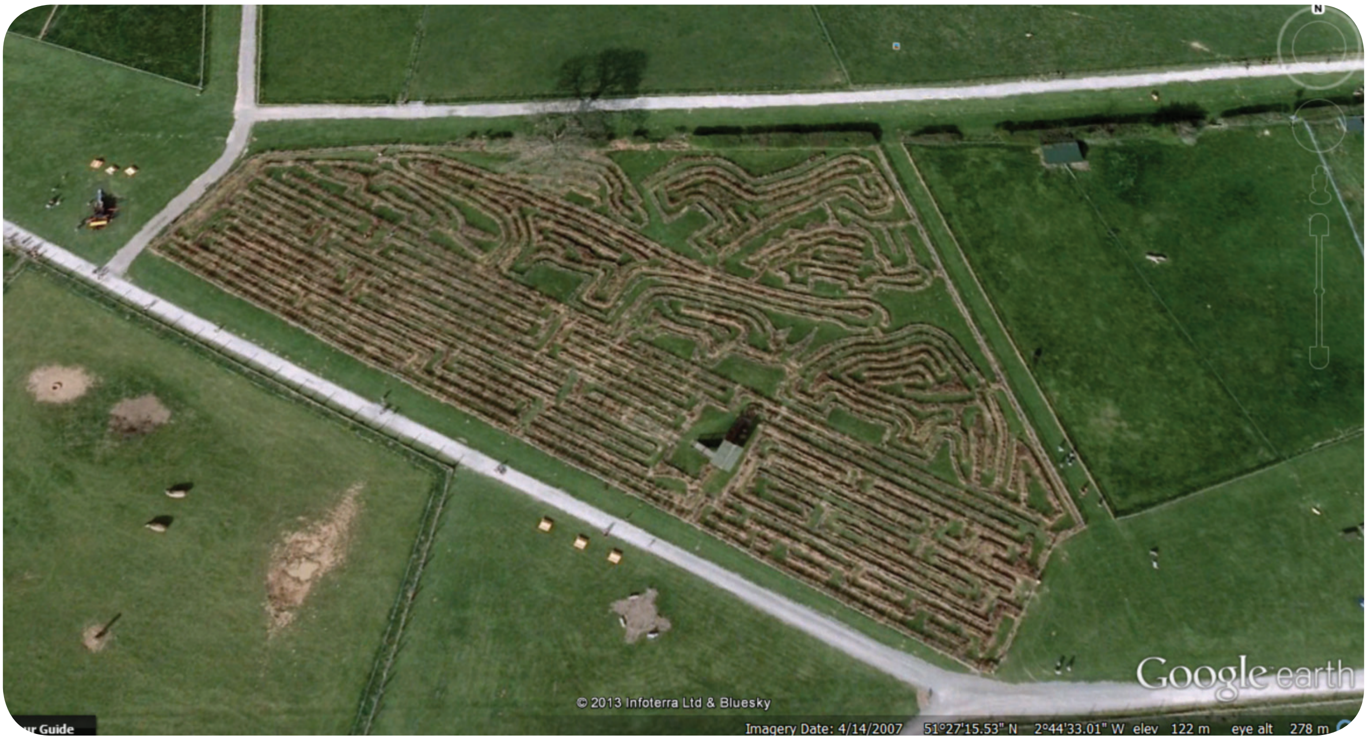


Fasten your seatbelts if you want a dramatic book on astonishing adventures of faith! If you have followed the development of Noah's Ark Zoo Farm in Somerset, UK, which highlights creation themes (Bush, 2008), you will not be able to put this book down. It is the story of its pioneer and strategist: a remarkable, inspirational Christian. In spite of being the target of vitriolic attacks from militant atheists and animal rights extremists, Anthony Bush has responded in courteous and gracious ways – and God has blessed him and his team. The Zoo Farm received an award in 2010 for being among the top four "South West Tourism's large leisure attraction"; has gained the "Learning outside the Classroom" Quality Badge; and received their millionth visitor on 19 March 2011. Here are many lessons on how to be overcomers in Christ's name.

The reviewers and their family visited the Noah's Ark attraction several times in the early 2000s. We were so interested that we could hardly bring ourselves to leave the site! Since then, the growth has been remarkable, with rhinos, giraffe, tigers, lions and, most recently, elephants. The vision is to have at least one breeding pair of every (extant) created kind that was *preserved* on the Ark. In addition, an Ark-sized maze has been planted, giving visitors a better appreciation of the dimensions that are recorded in the Bible.

The challenges and set-backs have been substantial. Anthony Bush refers to the hard year of 2009 and the all-time low of March 2010. There were (unfounded) accusations of cruelty and abuse to animals in captivity; protestors were using megaphones, placards and leaflets to try and prevent visitors entering; those who were supposed to be investigating these allegations were dragging their heels, fuelling the suspicions of some press reporters. There were indications that even local Christians were not sure what to think and were keeping their distance. The weather was bad – the coldest for 32 years, affecting farm crops as well as the zoo. Visitors were deterred and heating costs were high. Anthony Bush and his team made sure they counted their blessings and reminded themselves of God's leading for their project. Then came an incident involving Doris the duck that was like a ray of sunshine breaking through the gloom.

Doris had just become the proud mother of eight charming ducklings. Ten metres from her nest was a tranquil pond, and she led them into the water.


© 2013 Infoterra Ltd & Bluesky
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Google earth
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The Maze at Noah's Ark Zoo Farm, as captured by Google Earth. Note the two rhinos bottom left.

Suddenly, a seven-foot tiger with open jaws landed just half a metre from Doris and her fledglings! Tiana the tiger was a star attraction in Noah's Ark Zoo Farm and had smelt duck for weeks. Doris' nest had the protection of an electric fence, but not the pool. Tiana had spotted food and was intent on catching it! Doris soared into the air and circled over Tiana's head, quacking loudly. She landed on the ground and pretended her wing was broken. Falling for the ruse, Tiana left the pool (and the ducklings) and advanced towards Doris. But the brave duck took to the air again and headed back to her young family. Tiana attacked a second time. Astonishingly, Doris repeated her stratagem – including the broken wing act. Again, Tiana followed the 'food' only to see Doris escaping into the air. This time Doris landed on the other side of the electric fence. The story ends with the tiger being called away by her keeper (who had heard this commotion); the ducklings responding to their mother's calls; and the family being reunited in their place of safety.

The elephant enclosure has been several years in planning – and was still on-going when this autobiography was published. The approach adopted by Anthony Bush is instructive. As an experienced farmer, he is very aware of animal husbandry issues. As a Christian, caring for creation is part of being a steward under God's authority. Very quickly, he realised that none of the UK zoos were providing a suitable environment for captive elephants, and their animals tend to be overweight and have a shorter lifespan than wild elephants. Anthony Bush's approach to keeping captive elephants addresses all these deficiencies. After being mystified by the opposition of the RSPCA and groaning at the campaign "Stop the Elephant Enclosure at Noah's Ark", readers of this autobiography really should take a look at the Elephant Eden website page to get an encouraging update.

Just as remarkable, Anthony and Christina Bush only started Noah's Ark after 35 years of tenant farming. They took the opportunity to purchase the farm as they approached retirement age. He comments:

> "I had wondered about a Noah's Ark theme park, feeling that if we could put Noah in place, people would automatically put God in place. God, after all, was the beginning, middle and end of Noah's story, which was the best known story in the world. We did not need any extra income, nor particularly want the huge amount of work it would involve. Christina and I were both sixty, we had no mortgage, we did not need to diversify and we were both low maintenance. But still the challenge would not leave us: to put this farm […] at God's service."

This autobiography is really two books in one! We have the record of the planning, the opening (in August 1998), and the growth of the project to achieve its award-winning status. We have also the story of a farmer's son who became a farmer and an activist in the National Farmers' Union. There are numerous insightful comments on the developments in farm machinery during these years and the demanding nature of life as a farmer. He pioneered the "Send a Cow" ministry to Africa. This same person had an active ministry in his local Anglican church: preaching, working with youth, and finding numerous ways to help young people (and married couples) think about sex, marriage, relationships and lifestyles. Anthony was the Director of the Billy Graham evangelistic mission to Bristol (part of Mission England in 1984). He was a member of the Church Assembly and the subsequent General Synod for 17½ years, contributing to many of the important debates within the Church of England.

Whether we are young or old, we need good role models. Anthony and Christina are professional people who have spent their lives seeking to be salt and light in the community. This is a book firstly for non-Christians, particularly men, to point them to Jesus as Saviour and Creator of all. It uses ordinary language and is jargon-free. It scratches where people itch – especially on issues of sexuality and personal relationships. It contributes a significant discussion of what passes as the science of origins in our day, showing that much of it has a religious agenda and is hostile to God's revelation of Himself.

Secondly, for Christians, this book is a reminder of the battles we face as we stand for God's truth. Anthony Bush's life provides inspiration and encouragement to all who seek to witness to Jesus Christ. It helps us to be overcomers against the odds. For anyone in, or contemplating, a ministry that draws hostility, or seems like just plain mission impossible, the story of Noah's Ark Zoo Farm shows us that nothing is impossible with God. ■

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Bush, A. Noah's Ark Zoo Farm: an update, *Origins,* No.48, August 2008, 15-19.

Panoramic view from the observation tower, with the maze in the centre and Elephant Eden beyond. The two rhinos are again in the bottom left .
(Image courtesy of Anthony Bush).

From fish to Gish?

Nancy Darrall

Dr Duane Gish was one of the founder members of the Creation Research Society in America, in 1961 and later went on to work fulltime for the organisation. He was well known in the USA as well as internationally as a speaker, writer and formidable debater. He used his name in a memorable catch phrase "from fish to Gish" to emphasise to his audiences the impossibility of evolution.

He had spent 18 years in biochemistry research, first at Cornell University Medical College, then with the Virus Laboratory at the University of California, Berkeley and then with the Upjohn Pharmaceutical Company. However, in 1970 he left what was secure and well-paid employment to join Dr Henry Morris at the Institute for Creation Research, developing a speaking ministry in the USA and overseas. He was well able to deal with the subject at an academic level as a qualified scientist with a good knowledge of the scientific literature, but he was also gifted to make the subject accessible to college students and lay audiences. Opportunities also came for formal debates; he is thought to have taken part in around 300 and won them all! Advice circulated that it was not recommended to debate Duane Gish as they would "surely lose"!

Highly regarded in the UK for his work, he is perhaps best remembered for his readily accessible books on the subject that have helped many to grapple with the issues in the face of increasing opposition to Creation from our secular scientific society. His book *Evolution? The fossils say NO!* was one of the first books on my bookshelf to deal with the issue of evolution and creation and the updated version Evolution? The fossils still say NO! along with *Fossils: key to the present* and other books are still valuable resources available today.

We gratefully remember him as "A Giant in defence of scriptural authority". ■

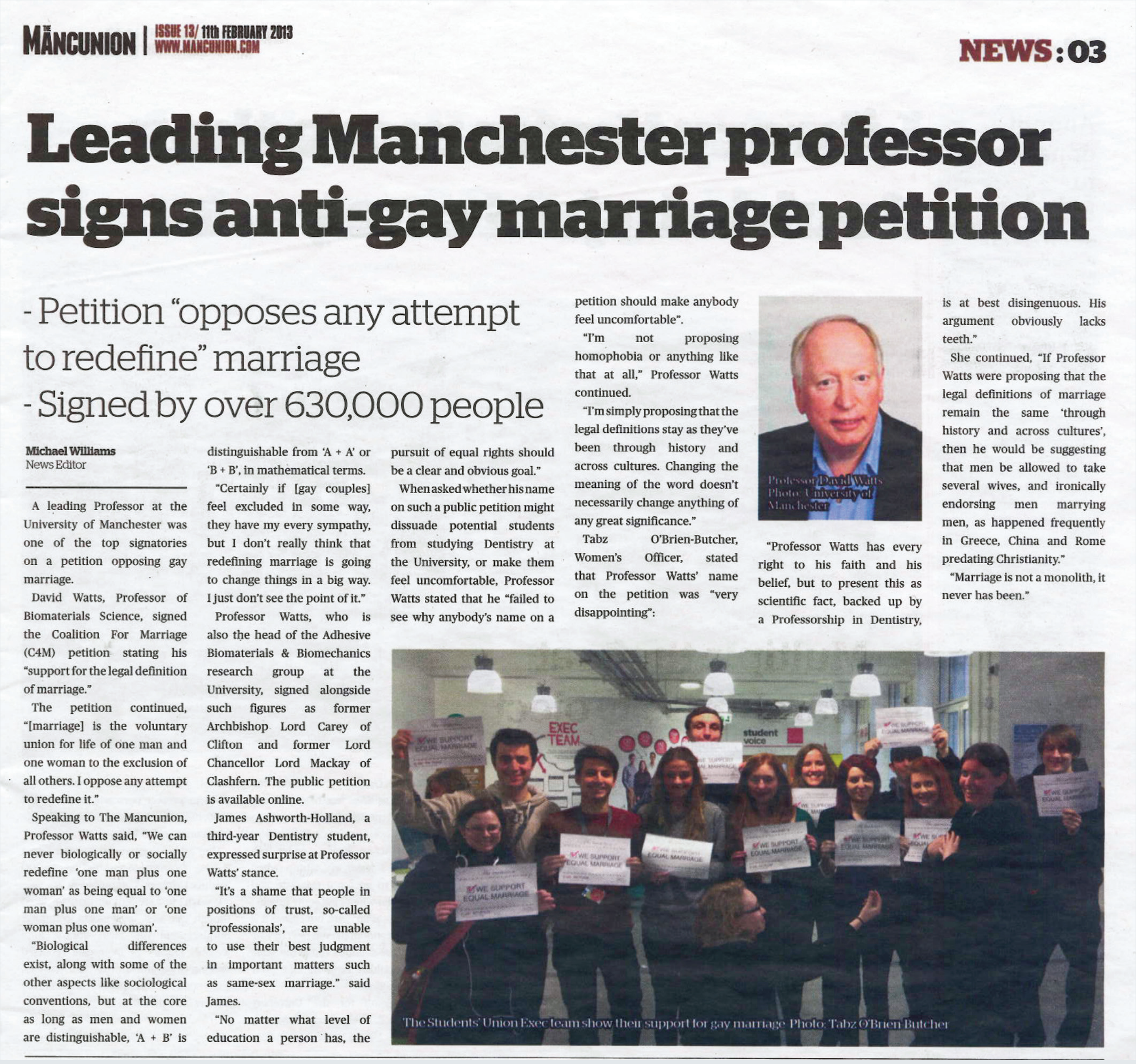
Duane Gish explains why he got involved with Creation ministry:

> "I felt very keenly about this issue; I had for a number of years. I actually started to lecture on this subject in 1957 or 1958 when I was on staff at the virus lab. When I went to the Upjohn Company, I was traveling to Ohio, Indiana, Illinois, and all around Michigan to lecture on the subject. I was writing articles for the Creation Research Society Quarterly and other sources. That's how I began to get increasingly involved in it. I felt very keenly about it because I knew that in the public schools the kids are being indoctrinated with evolution theory as an established fact. It was taught as a naturalistic, mechanistic, non-theistic theory. Not to say that all evolutionists are atheists, because they are not, but the theory itself is a process of self-transformation. God is not involved; God is not necessary. I felt it was having a very negative influence on our society. We've seen tremendous changes in our society in the last fifty years. When I was a kid, I didn't know anybody who used drugs, never heard of such a thing. Now we have this tremendous drug culture, legalized pornography, legalized abortion, crime and violence on an unprecedented scale, an AIDS plague, and all this which, if fifty years ago you told us this was going to happen, I wouldn't believe a word of it. I think that one of the major reasons for the changes has been the influence of the teaching of evolution. I believe our judges, our educators, our legislators, having been indoctrinated in evolution theory; their decisions are based on this more or less materialist philosophy. That's why we've seen the changes that we've seen in our society. I just came back from Russia a few days ago. Over there, the officials in the ministry of education are concerned, as they said, to restore the children to the family and to restore some basis for a moral and ethical code in their educational system which was stripped out completely by the communists. Now they've seen seventy years of atheism and the result of it, and they want to reverse it. Here in the United States, we're doing the opposite. We're trying to take the children away from the family. We're trying to strip every vestige of a Christian moral code of ethics out of our schools, just the opposite of what they're trying to do in Russia. So I want to see the reverse of this situation. In our public schools, evolution is taught as established fact. They're taught the Big Bang theory and everything started out as hydrogen gas. The kid's sitting there and hearing the teacher say that everything started out as hydrogen gas and concludes that his ultimate destiny is a pile of dust and there is no God. Therefore, there is no one to whom he is responsible."

Source

Creation Matters, 1(1), 1996.
http://www.creationresearch.org/creation_matters/96/cm9601.html#anchorgish

Editorial: Continued.



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NEWS:03

Leading Manchester professor signs anti-gay marriage petition

- Petition "opposes any attempt to redefine" marriage
- Signed by over 630,000 people

Michael Williams
News Editor

A leading Professor at the University of Manchester was one of the top signatories on a petition opposing gay marriage.

David Watts, Professor of Biomaterials Science, signed the Coalition For Marriage (C4M) petition stating his "support for the legal definition of marriage."

The petition continued, "[marriage] is the voluntary union for life of one man and one woman to the exclusion of all others. I oppose any attempt to redefine it."

Speaking to The Mancunion, Professor Watts said, "We can never biologically or socially redefine 'one man plus one woman' as being equal to 'one man plus one man' or 'one woman plus one woman'.

"Biological differences exist, along with some of the other aspects like sociological conventions, but at the core as long as men and women are distinguishable, 'A + B' is distinguishable from 'A + A' or 'B + B', in mathematical terms.

"Certainly if [gay couples] feel excluded in some way, they have my every sympathy, but I don't really think that redefining marriage is going to change things in a big way. I just don't see the point of it."

Professor Watts, who is also the head of the Adhesive Biomaterials & Biomechanics research group at the University, signed alongside such figures as former Archbishop Lord Carey of Clifton and former Lord Chancellor Lord Mackay of Clashfern. The public petition is available online.

James Ashworth-Holland, a third-year Dentistry student, expressed surprise at Professor Watts' stance.

"It's a shame that people in positions of trust, so-called 'professionals', are unable to use their best judgment in important matters such as same-sex marriage." said James.

"No matter what level of education a person has, the pursuit of equal rights should be a clear and obvious goal."

When asked whether his name on such a public petition might dissuade potential students from studying Dentistry at the University, or make them feel uncomfortable, Professor Watts stated that he "failed to see why anybody's name on a petition should make anybody feel uncomfortable".

"I'm not proposing homophobia or anything like that at all," Professor Watts continued.

"I'm simply proposing that the legal definitions stay as they've been through history and across cultures. Changing the meaning of the word doesn't necessarily change anything of any great significance."

Tabz O'Brien-Butcher, Women's Officer, stated that Professor Watts' name on the petition was "very disappointing":

Professor David Watts
Photo: University of Manchester

"Professor Watts has every right to his faith and his belief, but to present this as scientific fact, backed up by a Professorship in Dentistry, is at best disingenuous. His argument obviously lacks teeth."

She continued, "If Professor Watts were proposing that the legal definitions of marriage remain the same 'through history and across cultures', then he would be suggesting that men be allowed to take several wives, and ironically endorsing men marrying men, as happened frequently in Greece, China and Rome predating Christianity."

"Marriage is not a monolith, it never has been."

The Students' Union Exec team show their support for gay marriage Photo: Tabz O'Brien Butcher

disingenuous. His argument obviously lacks teeth." She continued by claiming that gay marriage was commonplace in ancient Greece and Rome. A Greek work colleague of David Watts made the following comment privately: "This idea is total nonsense; whereas homosexual practice was widespread in the classical world, homosexual marriage was unheard of".

It is one thing to offend a group of students, but quite another to be perceived as failing to endorse the ethos of equality adopted by one's employer. Furthermore, when the law provides a definition of equality, the spectre of being brought before the courts on charges of discriminating against sexual orientation is transformed into a reality. Charles Moore had some incisive comments in an article published by *The Daily Telegraph* (10 May 2013). The following paragraphs explain the significance of the legal changes.

> "As the Bill took shape last year, it became clear that its authors had failed to consider two crucial things. The first was the nature of current Equality doctrine. The word "equality" is often bandied about loosely, but, thanks to the modern European dogma of human rights, it now has virtually all-embracing legal force.
>
> According to the "public sector equality duty", all acts and institutions of government must enforce Equality in all its various "strands". (There are seven of them, and "gender reassignment" is given the same status as "religion".) So if same-sex marriage is permitted by law, opposition to it will become a form of discrimination against sexual orientation (one of the seven strands).
>
> The Government says until it is blue – or rather, pink – in the face that conscientious objections to same-sex marriage will be protected. It has specifically laid down that gay marriages may not be celebrated in

> Church of England churches. But it failed to still the anxiety. If marriage is redefined by statute to include same-sex marriage, then a teacher who refuses to teach this as right is in breach of his public sector equality duty. And while a church will be protected in its own premises, a Christian charity providing services to all, or religious groups wanting to hire council facilities, can be banned by the accusation that they are "homophobic" organisations. If same-sex marriage becomes law, people who conscientiously oppose it will be barred from a career in the public service, and the religious motive, which is the strong arm of the charitable impulse, will be amputated. Even without gay marriage, Catholic adoption agencies which have refused to place babies with homosexual couples have been forced to close down. With same-sex marriage, any charitable religious assistance in family life – a Christian marriage guidance bureau such as Marriage Encounter, for example, maybe even the famous Alpha Course – will be vulnerable to state legal attack."

It follows that, even if a business or organisation declares itself as having a Christian ethos, there will be no protection against equality laws. When the Marriage (Same Sex Couples) Bill is passed, all organisations will be perceived as discriminating if they uphold Christian marriage between one man and one woman. They are all vulnerable to legal action.

What relevance has Genesis to these developments? What contribution can Biblical Creationists make to this debate? The first point we should recognise is that arguments based on the "traditional view of marriage" are perceived as weak in the eyes of those who question the value of traditional views. Furthermore, arguments on the role of family life and the bringing up of children will not be deemed weighty, as relatively few homosexual couples are likely to adopt children. Biblical Creationists want to defend marriage as "God's way", so we need to appeal to biblical authority. We need to quote the words of the Lord Jesus Christ, who explained the essence of marriage by pointing people to what it was like "at the beginning" when God gave Eve to Adam as a life-partner. We can also point out that homosexual behaviour is not overlooked in the Bible, but is presented as one of many expressions of human rebellion against God (as for example in Romans 1: 18-32). By refusing to condone homosexual behaviour, we are not discriminating against people: we are seeking to do them good by pointing them to the Lord. We want to be able to repeat Paul's words when he wrote: "And such were some of you" (1 Corinthians 6:11). John Stott has provided us with excellent reading material on these topics. Here are some thoughts from Adam's love poem of Genesis 2:23:

> *23. This is now bone of my bones*
> *and flesh of my flesh;*
> *She shall be called "woman",*
> *for she was taken out of man.*
> *24. For this reason a man will*
> *leave his father and mother,*
> *And be united to his wife,*
> *and they will become one flesh*

> "Even the inattentive reader will be struck by the three references to "flesh": *"This is . . . flesh of my flesh . . .they will become one flesh."* We may be certain that this is deliberate, not accidental. It teaches that heterosexual intercourse in marriage is more than a union; it is a kind of reunion. It is not a union of alien persons who do not belong to one another and cannot appropriately become one flesh. On the contrary, it is the union of two persons who originally were one, were then separated from each other, and now in the sexual encounter of marriage come together again." (pp. 345-6).

Christians have always championed inclusiveness and opposed discrimination. These issues arise with age, gender, social status, disability, financial situation, religion, race, and personal circumstances. Whilst we also oppose discrimination based on sexual orientation, we cannot condone homosexual behaviour. It is an unfortunate characteristic of our generation that people cannot see the difference between seeking inclusiveness for all and yet declaring certain types of conduct to be offensive to God. We say this for all sexual activity outside marriage: adultery as well as homosexual behaviours. It is a tragedy that our legal system has banished God's authority from its consideration and reduced morality to a social construct. We live in a culture that has deep roots in secularism, and whatever remains of Christianity is a veneer and easily sacrificed. We are called to live under the authority of our Lord Jesus Christ and to be faithful to Him. This will mean challenging others, including our rulers, to consider where the source of authority lies. Is it in the decisions of elected representatives? Is it the judges? Are our standards of right and wrong of eternal validity or do they change with time? Some are already counting the cost of taking such a stand, but it will be good if all of us are ready to lift a banner for truth by openly acknowledging God's authority over the life of our nation as well as over our lives as individuals. ■

David J. Tyler

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